CP-1027

SERIAL NO. 3112

# ONKYO® SERVICE MANUAL

# DIRECT DRIVE FULLY AUTOMATIC TURNTABLE MODEL CP-1027F

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ONKYO®
AUDIO COMPONENTS

# SPECIFICATIONS

| | |
|---|---|
| Type: | Direct drive fully automatic turntable with auto lead-in and return, reject, repeat and cue button function; two-motor micro-computer design. |
| Turntable Platter: | 310 mm (12-1/4") aluminum die-cast |
| Motor: | Electronic servo direct drive brushless DC motor |
| Speeds: | 33-1/3, 45 rpm, adjustable ±3% |
| Wow & Flutter: | less than 0.028% (WRMS) |
| Signal-to-Noise Ratio: | better than 70 dB (DIN B) |
| Tonearm: | Statically balanced straight type |
| Effective Arm Length: | 224 mm (8-7/8") |
| Overhang: | 13 mm (1/2") |
| Offset Angle: | 21 degrees |
| Maximum Tracking Error: | +3 degrees, −1 degree |
| Suitable Cartridge Weight: | Min. 5, Max. 9 grams |
| Tracking Force: | 0 – 3.0 grams |
| Other Features: | Tracking force direct readout scale<br>Removable headshell<br>Anti-skating device |

| | |
|---|---|
| Cartridge (Except 120V model): | Moving magnet type |
| Type: | OC-51M |
| Frequency Response: | 20 – 20,000 Hz |
| Recommended Load Impedance: | 47 kohms |
| Recommended Tracking Force: | 2 grams |
| Compliance: | $8 \times 10^{-6}$ cm/dyne |
| Output Voltage: | 3.5 mV |
| Stylus Tip: | 0.5 mil diamond |
| Replacement Stylus: | DN-51ST |
| Power Supply: | AC 120 V, 60 Hz<br>AC 220 V, 50 Hz<br>AC 240 V, 50 Hz<br>AC 110-120/220-240V, 50/60 Hz |
| Dimensions (WxDxH): | 418 x 380 x 135 mm (16-1/2" x 15" x 5-3/8") |
| Weight: | 5.0 kg (11 lbs.) |
| Accessories: | Headshell, counterweight, adapter, instruction manual |
| Optional Recommended Headshell: | SH-21F |

Specificaitions are subject to change for further product improvements.

# CIRCUIT DESCRIPTION

## 1. Explanation of Operations

### 1-1. Automatic Operation Section

This turntable features fully automatic operation which is performed by IC201 (TMP4310AP4411) microcomputer.
Operation commands are transmitted to the micro-computer from the switches.

*Operations of each part

| | |
|---|---|
| Arm motor: | A pulse motor in which one pulse is 18° rotates by the 2-phase excitation method to create the power for fully automatic operations. |
| Plunger: | Works as a clutch to switch the movement of the pulse motor between moving the tonearm laterally and moving the lifter up and down. |
| Leaf switch: (SW205) | This switch determines whether the tonearm is up or down. (off when up, on at all other times) |
| Microswitch: (SW206) | Functions as the tonearm location sensor. The lead-in count for automatic operation is performed by counting the number of pulses of the pulse motor from this point. Also functions as the arm switch for manual operations. |
| Cam gear: | This causes the leaf switch (SW205) to operate and also has the slope for the elevation shaft that moves the tonearm up and down. |
| Pulley assembly: | The tonearm moves when the outer rubber ring comes in contact with the idler shaft on the gear side.<br>SW205 is turned on and off by the rotation of the pulley assembly which also turns the return sensor on and off. |

### 1-2. Order of Fully Automatic Operations

*Play

1. When the PLAY/REJECT button is pressed, IC201 terminal 18 becomes L, the pulse motor control terminal 11 goes from L to H and the pulse motor begins to rotate counter-clockwise.
2. In the same manner, the DD motor control terminal 15 goes from H to L and Q208 turns on to start the DD motor rotating. The speed indicator LED also illuminates.
3. The rotation of the pulse motor causes the cam gear to turn and the elevation shaft to rise.
4. As the elevation shaft rises, the leaf switch (SW205) turns off and the pulse motor stops for an instant (about 0.2 seconds).
5. Next, the terminal changes from L to H, Q204 turns on and the plunger goes to on.
6. The plunger causes the pulse motor rotations to be transmitted via the pulley by the idler to start moving the tonearm.

7. The pulses of the pulse motor are counted from the point where the rest switch (SW206) changes from off to on and moves the tonearm to the 30cm or 17cm lead-in point (according to the command of the size switch – SW204: 30cm when terminal 2 is H and 17cm when it is L). Note that the number of pulses is adjusted by adjusting the lead-in adjustment jumper wire.

8. Terminal 12 goes from H to L and the plunger goes to the off position to stop the tonearm movement. Then the pulse motor begins to rotate clockwise.
9. The cam gear starts to rotate in the opposite direction mentioned above and the leaf switch (SW205) immediately turns on. From that point, the pulses are counted and the tonearm stops at the down position to begin record play.

*Reject
1. Same as number 1 of the play section.
2. Same as number 3 of the play section.
3. Same as number 4 of the play section.
4. Same as number 5 of the play section.
5. The pulse motor starts to rotate clockwise and the plunger moves so the rotations are transmitted by the pulley to start moving the tonearm toward the arm rest.
6. The rest switch (SW206) switches from off to on to start counting the number of pulses to the arm rest. Terminal 15 of IC201 goes from L to H, Q208 turns off and the DD motor stops.
7. When the number of pulses to the arm rest has been counted, terminal 12 goes from H to L, the plunger goes to the off position, the tonearm stops moving and the revolutions of the pulse motor are transmitted to the cam gear.
8. The cam gear begins to rotate (clockwise) and the leaf switch (SW205) switches on. From that point on, the number of pulses is counted and the tonearm stops in the down position in the arm rest.

*Cueing (UP)
1. When the CUEING button is pressed, IC201 terminal 1 goes from H to L, the pulse motor rotates clockwise and turns the cam gear in the counterclockwise direction (toward the rear).
2. When the tonearm is up and the leaf switch (SW205) is off, the pulse motor stops.

*Cueing (DOWN)
1. When the tonearm is up (SW205 is off) and the CUEING button is pressed, the pulse motor rotates counterclockwise and turns the cam gear in the clockwise direction.
2. The leaf switch (SW205) goes from off to on and the pulses are counted from that point until the tonearm stops in the down position.

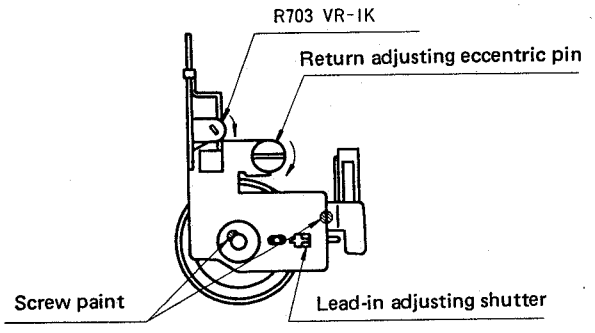
*Auto-Return
1. When the return circuit (circuit no. 700, circuit no. 300) operates, IC201 terminal 19 goes from H to L.
2. From this point on, operation is the same as reject.

*Repeat
1. Same as number 1 of the auto-return section.
2. Same as number 1 of the reject section.
3. Same as number 2 of the reject section.
4. Same as number 3 of the reject section.
5. Same as number 4 of the reject section.
6. Same as number 5 of the reject section.
7. When the rest switch (SW206) goes from off to on, the number of pulses to the arm rest is counted. When the count is completed, the pulse motor rotations change to the counteer-clockwise direction and the tonearm moves in the play direction again.
8. Same as number 7 of the play section.
9. Same as number 8 of the play section.
10. Same as number 9 of the play section.

# ADJUSTMENT PROCEDURES

1. **Lead-in Adjustment**
Roughly adjust the pulley shutter so the stylus lowers approximately into the lead-in grooves of a record. Next, adjust the jumper circuit (J220 – J225) on the printed circuit board (NADG-1046).
Press the record size selector to 30cm position and confirm the lead-in position. When outside the lead-in position, connect or cut the jumper wires by referring to the below table.

| | Cut | Connect |
|---|---|---|
| J225 | inner | outside |
| J220 | 0.3 mm | |
| J221 | 0.6 mm | |
| J222 | 1.2 mm | |
| J223 | 2.4 mm | |
| J224 | 4.8 mm | |




2. **Auto-Return Adjustment**

2-1. Sensitivity Adjustment

*Remove the DD motor and arm motor connectors and connect a millivoltmeter between the GND and "IN" of the terminal of DG-AS (NADG-1046).

*Move the tonearm to the innermost part of the the record and, in a position such that the pulley and deflection pin do not cover the end sensor (D701, D702), turn R703 counterclockwise as far as it will go and read the value on the millivoltmeter. (should be about 100mV)

*Next, turn R703 clockwise to the point where the millivoltmeter value has changed 2 – 3mV and set R703 at that point.

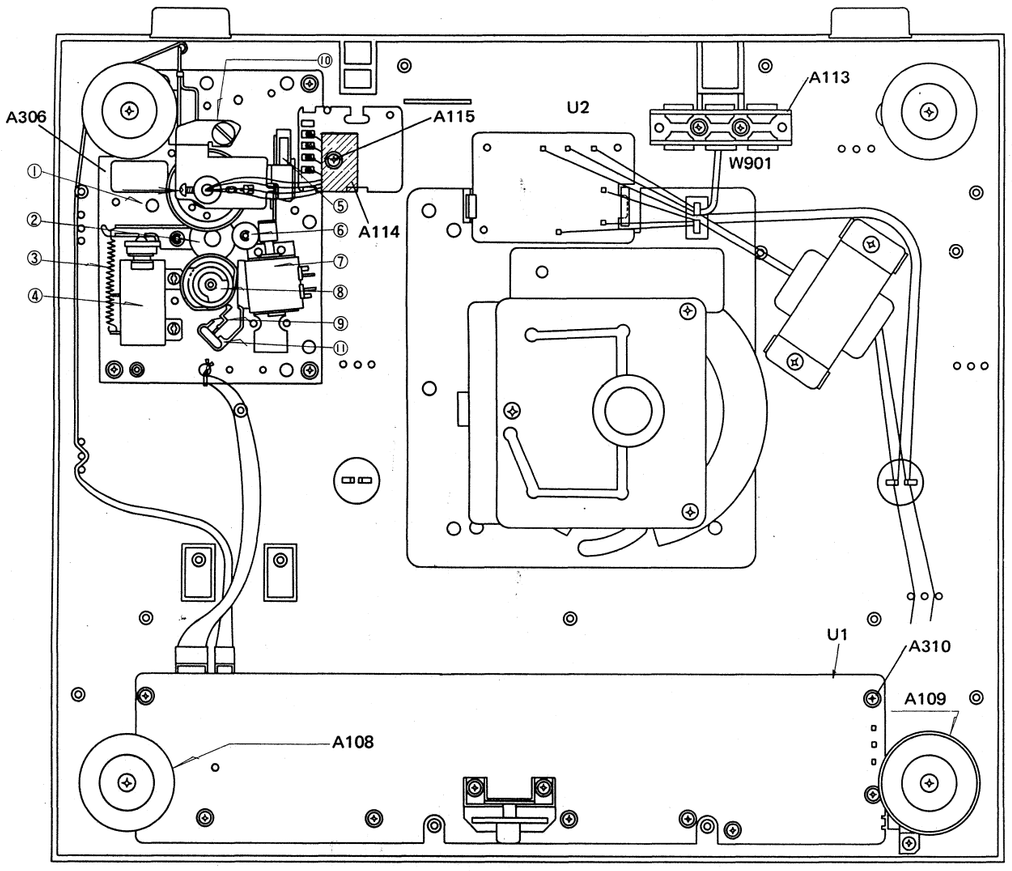
Notes: 1. Do not cover the light of the outdoor during adjustments.
2. If parts on the printed circuit board of RET-AS are replaced, perform the sensitivity adjustment procedure described above. No adjustments are necessary when other parts are replaced.

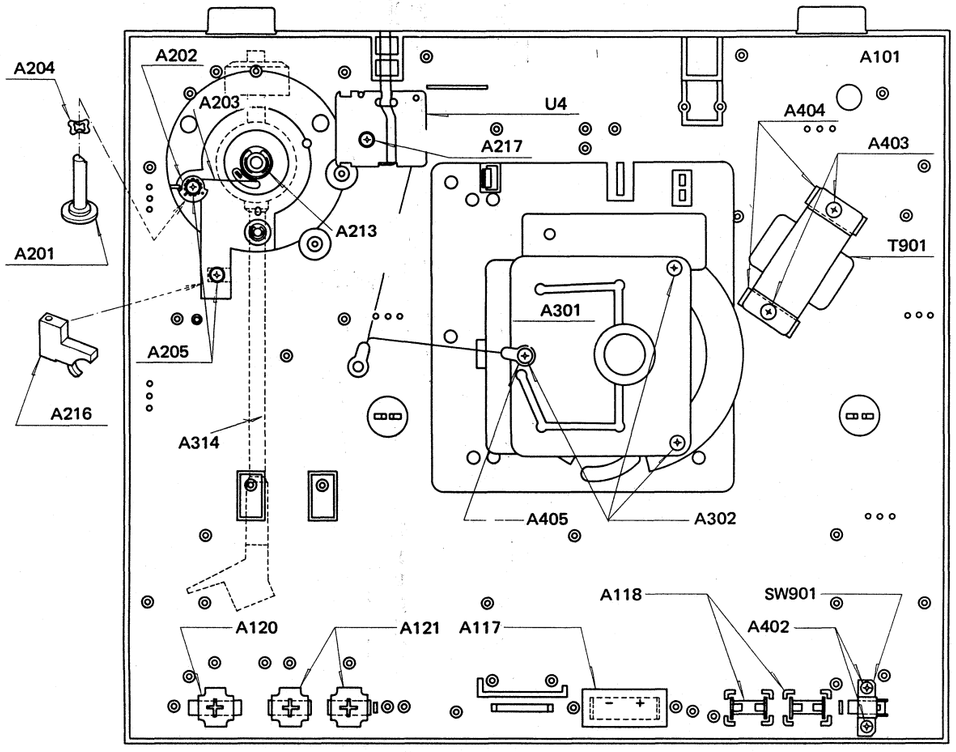
2-2. Auto-return position
Adjust the return position by the eccentric pin attached by the tonearm base. To adjust the return position for faster, turn the eccentric pin clockwise. To adjust the return position for later, turn the eccentric pin counter-clockwise.

3. **Tonearm Height Adjustment**
Turn the adjustment screw on top of the elevation section clockwise to lower and counterclockwise to raise the height of the tonearm during fully automatic operations.
specification 13 ~ 15mm

4. **Speed Adjustment**
Set the speed control VR of the operation section to about its mechanical center and, after confirming that the green LED in the speed indicator window is illuminated, adjust VR-45 and VR-33 on the main motor so that a 3kHz test record is 3,000Hz at 45 rpm and 3,000Hz at 33 rpm.

## COMPONENT LOCATION



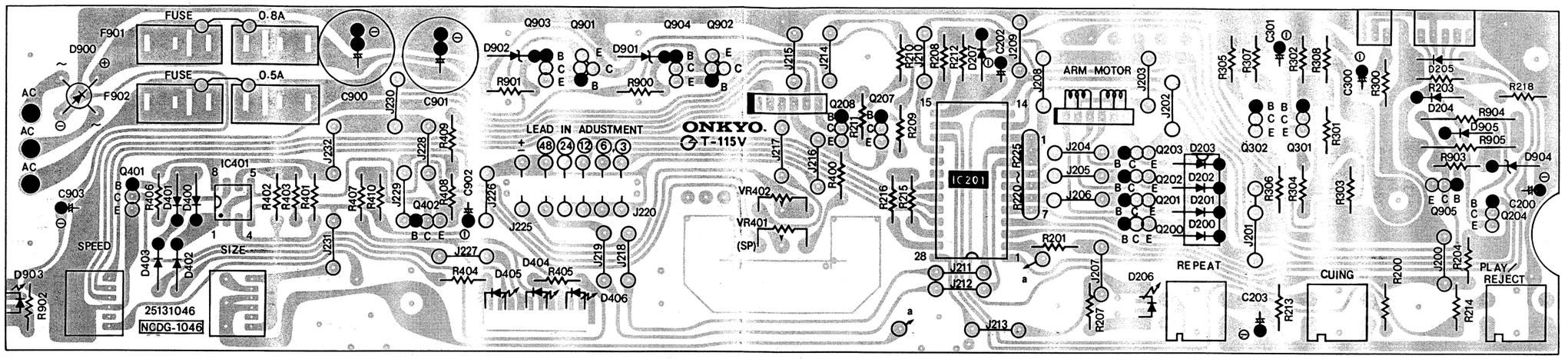




## PARTS LIST

| SYMBOL NO. | PARTS NO. | DESCRIPTION |
|---|---|---|
| A101 | 28110210 | Cabinet ass'y |
| A103 | 27262086 | Plate, switch |
| A104 | 27170086Z | Bottom board |
| A105 | 831130100 | 3TTW+10P, Tapping screw for bottom board |
| A106 | 24509215 | Dust cover ass'y |
| A107 | 28180062 | Hinge |
| A108 | 24509232 | Insulator |
| A109 | 27270058 | Spacer |
| A110 | 833140120 | 4TTP+12P, Tapping screw |
| A111 | 833140200 | 4TTP+20P, Tapping screw |
| A112 | 27140449 | Bracket, volume |
| A113 | 28400010 | Holder, power supply cord |
| A114 | 27150133 | Shielded plate |
| A115 | 831130100 | 3TTW+10P, Tapping screw |
| A117 | 28191070 | Clear plate |
| A118 | 28320446 | Knob S |
| A119 | 28320489 | Knob M, Power |
| A120 | 28320517 | Knob LT |
| A121 | 28320518 | Knob MT |
| A201 | 28320490 | Knob, IFC |
| A202 | 28400012A | Cam, IFC |
| A203 | 27180071 | Spring, IFC |
| A204 | 870071 | Wave washer |
| A205 | 831130100 | 3TTW+10P, Tapping screw |
| A208 | 24501363 | Lifter plate |
| A209 | 27260054 | Lifter shaft |
| A210 | 24506533 | Screw |
| A211 | 27180067 | Spring |
| A212 | 27180068 | Spring |
| A213 | 8930305 | Circlip |
| A216 | 28400013 | Tonearm rest |
| A301 | 24502123 | Motor |
| A302 | 833140120 | 4TTP+12P, Tapping screw |
| A304 | 24502120 | Turntable platter |
| A306 | 24506534 | Fulley automatic mechanism ass'y |
| 1 | | Mechanism ass'y |
| 2 | 24504310 | Lever |
| 3 | 24503100 | Spring |
| 4 | 24506474 | Solenoid |
| 5 | 24503108 | Microswitch |
| 6 | 24503097 | Wheel |
| 7 | 24502125 | Motor |
| 8 | 24503098 | Cam wheel |
| 9 | 24503102 | Leafswitch |
| 10 | 24506536 | Pulley ass'y |
| 11 | 24506463 | Cover |
| A307 | 27140411 | Bracket L |
| A308 | 834130082 | 3STS+8BQ, Tapping screw |
| A310 | 831130100 | 3TTW+10P, Tapping screw |
| A314 | 24501383 | Tonearm ass'y |
| | 24501321A | Screw, headshell |
| | 24501385 | Counter weight |
| | 24501354 | Headshell |
| | 24501330 | Cartridge mounting part ass'y (D) |
| | 24501346 | OC-51M, Cartridge (G/Q/U) |
| | 24501308 | DN-51ST, Stylus (G/Q/U) |
| | 24501283 | Stylus cover (G/Q/U) |
| | 24501287 | Screw (G/Q/U) |
| | 24501123 | Nut (G/Q/U) |
| | 24500079 | Washer (G/Q/U) |
| A318 | 28140340 | Cushion |
| A319 | 870073 | W10x18x1, Washer |
| A320 | 890010 | E-8, Circlip |
| A401 | 831130100 | 3TTW+10P, Tapping screw |
| A402 | 833130100 | 3TTP+10P, Tapping screw |
| A403 | 833140120 | 4TTP+12P, Tapping screw (D) |
| | 833140200 | 4TTP+20P, Tapping screw (G/Q/U) |
| A404 | 270520 | Support (D) |
| | 27265035 | Ring (G/Q/U) |
| | 87614012 | W4x12F Washer (G/Q/U) |
| A405 | 251073 | Terminal |
| D701, D702 | 225049 or 225050 | SEL1121R (B) or SEL1121R (C), L.E.D. |
| SW901 | 25035267 | NPS-111-L231P, Power switch |
| T901 | 230518 | NPT-735D, Power transformer (D) |
| | 230515 | NPT-746G, Power transformer (G) |
| | 230522 | NPT-746AG, Power transformer (U) |
| | 230527 | NPT-746Q, Power transformer (Q) |
| U1 | 16644546A | NADG-1046a, Digital and power supply pc board ass'y (D/G/Q) |
| U1 | 16640546B | NADG-1046b, Digital and power supply pc board ass'y (J) |
| U2 | 16639547A | NAPS-1047a, Power supply pc board ass'y (D) |
| | 16644547B | NAPS-1047b, Power supply pc board ass'y (G) |
| | 16640547C | NAPS-1047c, Power supply pc board ass'y (U) |
| | 16643510D | NAPS-1047d, Power supply pc baord ass'y (Q) |
| U3 | 16626517A | NARET-917a, Return circuit pc board ass'y |
| U4 | 16627510 | NAPI-1010, Output terminal pc board |
| W901 | 253099A | AS-UC-3, Power supply cable (D) |
| | 253083 | AS-CEE, Power supply cable (G/U) |
| | 253077 | Power supply cable (Q) |

Note:
(D): Only 120V model
(G): Only 220V model
(Q): Only 240V model
(U): Only universal model

## PRINTED CIRCUIT BOARD VIEW FROM COMPONENT SIDE




## PRINTED CIRCUIT BOARD — PARTS LIST

### DIGITAL AND POWER SUPPLY CIRCUIT PC BOARD (NADG-1046a/b) – PARTS LIST

| CIRCUIT NO. | PARTS NO. | DESCRIPTION |
|---|---|---|
| | **ICs** | |
| IC201 | 222622 | TMP4310AP, Micro computer |
| IC401 | 222465 | NJM4558D, Operation amplifier |
| | **Transistors** | |
| Q200–Q203 | 2211544 | 2SC1959 (Y) |
| Q204 | 2201291, 2201292 or 2201293 | 2SD985 (K), 2SD985 (L) or 2SD985 (M) |
| Q207, Q208 | 2211254 or | 2SC1815 (Y) or |
| Q301, Q302 | 2211255 | 2SC1815 (GR) |
| Q401, Q903 | | |
| Q402 | 2211454 | 2SA1015 (Y) |
| Q901, Q902 | 2201074 | 2SD880 (Y) |
| Q905 | 2211611 | 2SD471 (K) (D/G/Q) |
| Q905 | 2201074 | 2SD880 (Y) (U) |
| | **Diodes** | |
| D200–D205 | 223105 or | 1S1555 or |
| D207, D905 | 223133 | DS442X |
| D400–D403 | | |
| D900 | 223869 | W01 |
| D901 | 224096 | GZA5.6U |
| D902 | 224120 | GZA18U |
| D904 | 224113 | GZA13L |
| | **L.E.Ds** | |
| D404 | 225051 or 225052 | SEL1321G (B) or SEL1321G (C) |
| D405, D406 | 225049 or 225050 | SEL1121R (B) or SEL1121R (C) |
| | **Capacitors, elect.** | |
| C200 | 352780339 | 3.3μF, 50V |
| C202, C203 | 352780109 | 1μF, 50V |
| C300 | 352734709 | 47μF, 10V |
| C301 | 352733309 | 33μF, 10V |
| C900 | 352761029 | 1,000μF, 35V |
| C901 | 352751029 | 1,000μF, 25V |
| C902 | 352763309 | 33μF, 35V |
| C903 | 352744709 | 47μF, 16V |
| | **Resistors** | |
| R205 | 441521024 | 1kΩ, 1/2W, Metal oxide film |
| R220–R223 | 49121152504 | 1.5kΩx4, 1/8W, Network |
| VR401, VR402 | 5148051 | N16RG2KB15, Speed control variable |
| R904, R905 | 441722004 | 20Ω, 2W, Metal oxide film (D/G/Q) |
| R904, R905 | 441723304 | 33Ω, 2W, Metal oxide film (U) |
| | **Sockets** | |
| P204 | 25050085 | NSAS-6p-061, DD motor |
| P205 | 25050084 | NSAS-6p-060, Tonearm control motor |
| | **Plugs** | |
| P209 | 25055039 | NPLG-3p-30 |
| P210 | 25055041 | NPLG-5p-31 |
| | **Switches** | |
| SW201–SW203 | 25035089 | NPS-111-S54, Play, reject, repeat, cueing |
| SW204, SW401 | 25035215 | NPS-122-L179, Size, speed |
| | **Back plate** | |
| A118 | 28133037 | |
| | **Knob** | |
| A123 | 24506402-1 | Speed |
| | **Radiator** | |
| | 27160029 | |
| | **Screws** | |
| | 82113006 | 3P+6FN, Pan head |

### RETURN DETECTOR PC BOARD (NARET-917a) – PARTS LIST

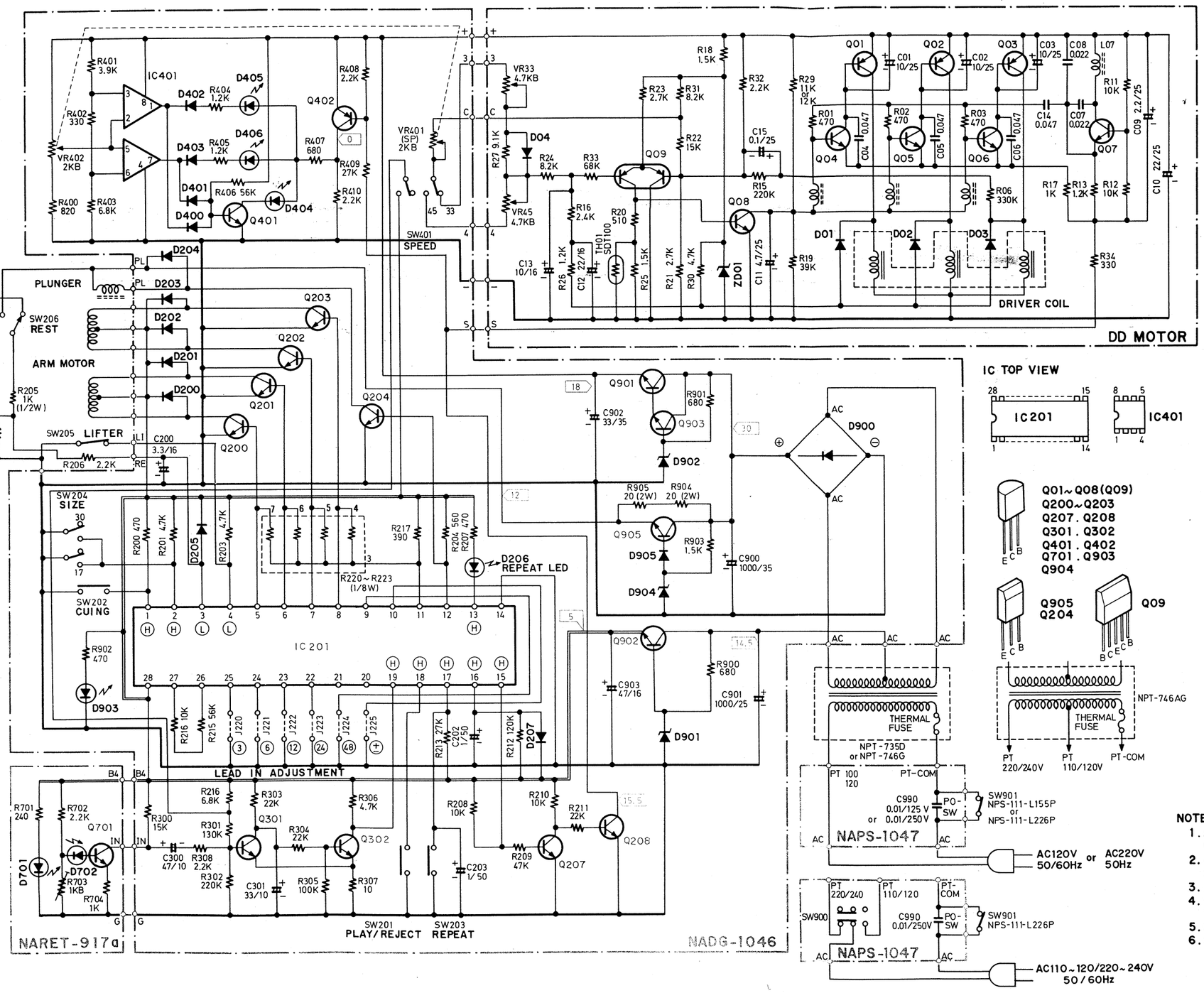
| CIRCUIT NO. | PARTS NO. | DESCRIPTION |
|---|---|---|
| | **Transistor** | |
| Q701 | 2211255 or 2211254 | 2SC1815 (GR) or 2SC1815 (Y) |
| | **L.E.D.** | |
| D701 | 225053 or 225054 | SEL111OR (B) or SEL111OR (C) |
| | **Photo diode ass'y** | |
| D702 | 225055 | SP-254SHO |
| | **Semi-fixed resistor** | |
| R703 | 5215051 | N08HR1KBF, Return sense adjustment |
| | **Socket** | |
| | 25050083 | NSAS-3p-059 |

### POWER SUPPLY PC BOARD (NAPS-1047) – PARTS LIST

| CIRCUIT NO. | PARTS NO. | DESCRIPTION |
|---|---|---|
| C100 | 3500060 | 0.01μF, 125V, CS (D) |
| C100 | 3500058 | PME265MB510, IS (G), (U) |
| C100 | 3500065 | DE7150FZ103PAC400V, IS (Q) |
| S900 | 25065109 | NSS-2255P, Voltage selector (U) |

Note:
(D): Only 120V model
(G): Only 220V model
(U): Only Universal model
(Q): Only 240V model

# SCHEMATIC DIAGRAM




| | |
|---|---|
| IC201 | TMP4310AP(4411) |
| IC401 | NJM4558D |
| Q01~Q03 | 2SA952 2SB561 2SA509 2SB605 |
| Q04~Q08 | 2SC945 2SC2320 2SC372 2SC458 LC945 2SC536 2SC828 JA1350 2SC1815 2SC733 2SC2021 |
| Q09 | 2SA798 2SA733 x2 2SA999 x2 2SA608 x2 2SA640 x2 LA733 x2 2SA933 x2 2SA1015 x2 2SA564 x2 |
| Q200~Q203 | 2SC1959 |
| Q204 | 2SD985 |
| Q207.Q208 Q301.Q302 Q401.Q903 Q904.Q701 | 2SC1815 2SC945 |
| Q905 | 2SD471 (2SD880)—UU |
| Q901.Q902 | 2SD880 |
| Q401 | 2SA1015 |
| D01~D03 D04 | 1S953 |
| ZD01 | RD5.1E H25C |
| D200~D205 D207.D905 D400~D403 | DS442X 1S1555 |
| D206.D405 D406.D903 | SEL1121R |
| D404 | SEL1321G |
| D900 | W01 |
| D901 | GZA5.6U |
| D902 | GZA18U |
| D904 | GZA13L |
| D701 | SEL1110R |
| D702 | SP29S SP254S |

IC TOP VIEW

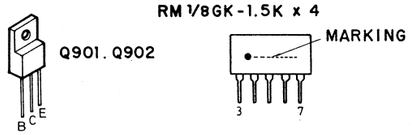





Q01~Q08(Q09)
Q200~Q203
Q207.Q208
Q301.Q302
Q401.Q402
Q701.Q903
Q904




R220~R223 RESISTOR NETWORK
RM 1/8GK-1.5K x 4




NOTE

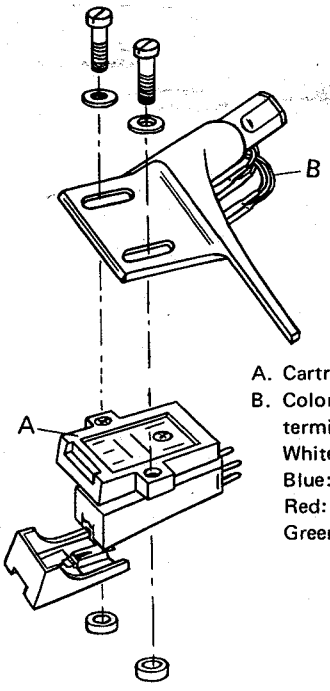
1. ALL RESISTORS ARE IN OHMS, 1/4WATT UNLESS OTHERWISE NOTED.
2. ALL CAPACITORS ARE IN μF, 50WV UNLESS OTHERWISE NOTED.
3. ELECTROLYTIC CAPACITORS (+ —) ARE IN μF/WV.
4. VOLTAGE IS MEASURED WITH V.T.V.M. WHEN TONEARM IS IN REST POSITION. ( )
5. (L),(H) SYMBOLS SHOW WITH THE POSITIVE LOGIC.
6. CIRCUIT IS SUBJECT TO CHANGE FOR IMPROVEMENT.

ONKYO CORPORATION

# SERVICE GUIDE

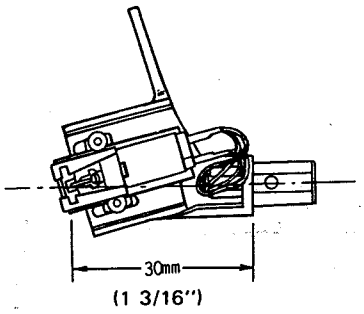
**1. Attaching the cartridge**

Attach the cartridge as shown below, connecting each of the color coded lead wires to the proper terminal. If a mistake is made, no sound will be heard or stereo reproduction will be lost. Also, to prevent damage to the stylus during installation operations, leave its cover on or remove the stylus completely.

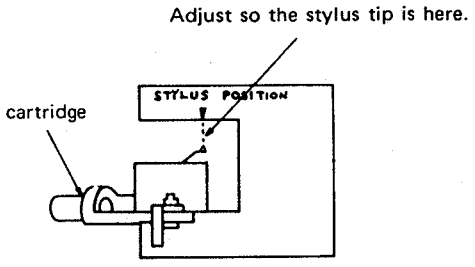



A. Cartridge
B. Colors of the headshell lead wires and cartridge terminals:
White: left channel signal (L)
Blue: left channel ground (LE or LG)
Red: right channel signal (R)
Green: right channel ground (RE or RG)

Adjust so the distance between the stylus tip and the base of the headshell is 30 mm (1 3/16") and tighten the screws. This assures the effective length and overhang of the tonearm are correct.



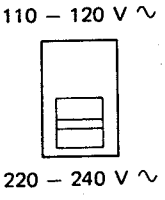

Use the included overhang gauge as shown below, placing the cartridge in the gauge and setting the location of the stylus tip as indicated.



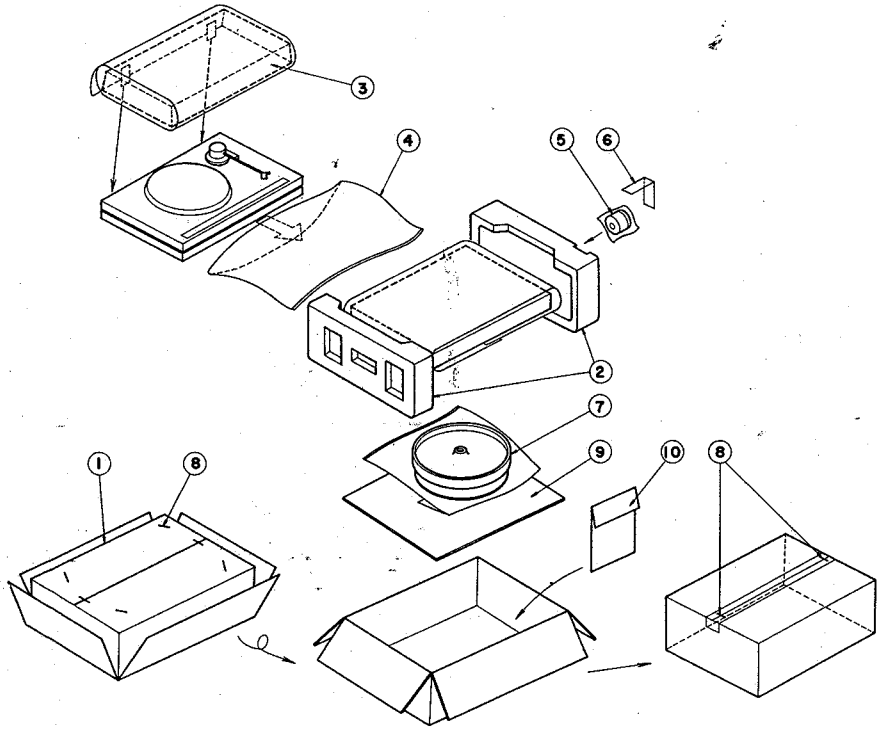

After attaching a different cartridge, always balance the tonearm again and set the appropriate tracking force.

**2. Voltage selector (Universal model)**

The voltage selector is located on bottom of the cabinet. If a voltage change is necessary, change the voltage selector switch to the proper voltage.



# PACKING PROCEDURES




| REF. NO. | PARTS NO. | DESCRIPTION |
|---|---|---|
| 1 | 29050460 | Master carton box |
| 2 | 29090568 | Pad |
| 3 | 29100050 | Protection bag |
| 4 | 29100049 | 460x620mm, Poly bag |
| 5 | 29100002 | 80x150mm, Poly bag |
| | 24501385 | Counter weight |
| 6 | 260013 | Tape |
| 7 | 29100046 | 370x470mm, Poly bag |
| | 24509111-1 | T.T mat |
| | 24502120 | Turntable platter |
| 8 | 282301 | Sealing hook |
| 9 | 29090566 | Pad sheet |
| 10 | | Accessary bag ass'y |
| | 29340519 | Instruction manual (D) |
| | 29340520 | Instruction manual (G/Q/U) |
| | 24509197 | Overhang gauge |
| | 292049A | 45 r.p.m. adaptor |
| | 29365006 | Warranty card (N) |
| | 29365005-3 | Warranty card (V) |
| | 29358002 | Service station list (N) |
| | 24501330 | Cartridge mounting parts ass'y (D) |
| | 25055018 | CV-K-1, Conversion plug |
| 11 | 260012 | Damplon tape |

Note:
(N): Only U.S.A. model
(U): Only West Germany model
(G): Only 220V model
(D): Only 120V model
(Q): Only 240V model
(U): Only Universal model

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